THE ARISTOCRACY OF INFANCY AND THE CONDITIONS OF ITS BIRTH

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ARISTOCRACY, according to Plato, is the rule of the best born, that is, according to conventional definition, those who can trace an ancestry filling an important office or exercising great influence. Under this definition it is assumed that all members of a family are equally endowed at birth with those qualities which have led to the pre-eminence of their progenitors, or that they are more likely to inherit such attributes than those of a more humble stock.

Man will always have an aristocracy, irrespective of the basis of selection, and inheritance must play an important part in the choice of such individuals, but the fact that the endowment on each member of a family is indiscriminate and is not influenced by law is, as I hope to show in this and a succeeding paper, a wrong conception.

The disrepute into which the hereditary governing class has fallen in the last decade, is, I think, not due to the natural degeneration of the breed and loss of prestige, but rather that the law of selection, namely, the eldest, is not likely to fall upon the physically and mentally fittest person to carry on the work and influence of the parent. The intensity, if I may use such a term, of the transference of parental qualities to the offspring is governed by certain well defined laws, which, though they may vary in strength and at times be masked by other factors, still are always in operation, and that obedience to these laws must in time lead to the pre-eminence of that stock. At present we do not mould our customs by them and this is in the main, the origin of certain changes that are at present imminent and others that have taken place in our political constitution.

In this paper my intention is to confine myself to the Infant

and the conditions of its birth, but at a future time I intend to deal with its later life. An initial difficulty immediately arises as to the meaning of the term "best born" as applied to an immature population. With adults there is no such difficulty, as by standards of physical development, mental power and vitality, a meaning to the word "best" can easily be assigned. With infants a much more subtle problem has to be negotiated. Perhaps the best criteria that can be taken is the power of survival. I do not say that a better one is not available, but it has the advantage of being defined, for nothing can be more definite than death, and further, such information can be accurately and easily obtained. Vitality, as measured by power of survival, is, as I hope to shew in another paper, largely correlated with those mental and physical attributes, which lead to success under our modern social system.

The criterion of the term "best born" as I intend to use it, in respect to our infant population, is their power to survive, and as a measure of that power I shall largely use what is known as "Infantile Mortality," or the number of infants dying in the first year of life per thousand born during the same year, a figure which in different parts of the country varies from 100 to 200 per 1,000 births. Recently there has been presented to us a complete report by the Government containing all that is known concerning what is rightly described as a "slaughter amongst the innocents." The object of that report and my present purpose are essentially different, though the material and standards used are much the same. The underlying principle of humanity is embodied in it as in all other health material of a similar nature, namely, the saving and preservation of life irrespective of its economic value, and at the present time such an ideal must be ever before us as the brotherhood of man demands it. Apart from that ideal, there is a feeling in the minds of many, and even those who constitute our Health Committees, that the great waste of early human life is not all evil. Anyone taking a broad view of the efforts that are being made to prevent it could not be struck either by their sincerity or enthusiasm, but would come to the conclusion that the question of Infant Mortality was not taken very seriously, and if one probed further one would almost

inevitably find that the cause of the indifference largely arises from the fact that the problem is not understood, even in its most rudimentary details. Upon perusal of reports either by the Goverment or municipal bodies one would find there little beyond elaborate statistical tables, probably supporting such conclusions as commonsense had already taught us. In fact I should think that one's ideas would be very much confused, for facts would be found that appear to be diametrically opposed. We are told in the Government Report that Infantile Mortality can be taken as a safe guide of sanitation or the want of it, yet in Ireland as a whole, where the sanitary conditions are not exemplary, the mortality is lower than that for England. Many other examples could easily be given. If there is one criticism I would make of all reports bearing on this point, it is the subsidiary and unimportant place given to the mother. She is mentioned of course, but never, and I think I am right in saying it, as the predominant factor. The child is looked upon as a separate unit from the time of its birth, and statistically is treated as such. A very casual acquaintance of a life table will show that biologically a child is not an independent individual until the tenth or eleventh year, when it corresponds to a chick of a few days' growth after hatching. I do not wish to criticise the fallacies into which the sanitary authorities under the guidance of their experts on occasion drift; they simply form a reflection of the errors of their parent body when dealing with massed detail as against individual experience, let it suffice to say that out of error truth is born.

I propose then to take as the measure of my standard of the "best born" the figure known under the name of Infantile Mortality. It is not my intention to consider the immediate cause of the deaths, whether it be measles, whooping cough, or other disorder, for though these are conditions which account for over half our deaths at the early ages and are classed as being of a preventable nature, they are not the true cause of death, but simply the final act in a played out drama. In my own town, from which much of my data was collected, a series of events led to an interesting result. The winter of 1909-10 was mild with us and epidemic disease was, relatively speaking, scarce.

The infantile death-rates were low. The summer of 1910 was cold, and diarrhœa was not prevalent. Now, as I hope to shew, under such conditions a certain type of child had survived, a type which can be found by the conditions of its birth. In the spring of 1911, measles naturally became very prevalent amongst the susceptible population that had slowly accumulated, and this being associated with a severe March, the death-rates rose to a startling figure, and practically the whole of those immature and feeble lives that had previously escaped were swept away along with a few of a stronger kind. That this was the case I was able to verify, and it was through considerations under which the best are born that much of my information was obtained.

Conclusions, based on immediate causes, attributed these death-rates to the prevailing epidemic and negligence on the part of the mothers, but more mature investigation shewed that measles, or whatever other disease happened to be prevalent, were mere links in a chain of circumstances that could be traced to a more direct cause. The facts that I propose to consider may be classed under certain headings. Firstly, as would naturally occur to one, the age of the parent. It is surprising, and I have made considerable search, though I am unable to find any detailed considerations bearing on this point, which one would naturally think to be of paramount importance. That births occurring at the beginning and end of married life are in some way different from the middle ones has been appreciated I am aware, but that there is a regular sequence of fitness according to the age of the parents, is, I believe, a new conception. I first drew attention to this fact in the *Medical Officer* in 1910. Dr. John J. Buchan of St. Helens independently and at a later date drew attention to the influence of the sequence of birth, to which fact I had also previously referred and shown that this was mainly an age influence. A glance at Table I. given at the end will show that the mortality falls from the beginning of life until the twenty-fourth year is reached and then slowly rises again. Under nineteen years it is 171 and towards the twenty-fourth year it falls to 130. From some additional figures taken even from a slum population it fell to below 100. From the twenty-fourth year it steadily rises until in the class over forty years of age it

reaches the figure 330. The history of children born of parents of this age is interesting, though the number of data I possess is not large, still it appears as if the expectancy of life of a child born after the forty-third year is not more than twenty-one years. Now as the object of reproduction is to reproduce, it is mere waste to give birth to offsprings that will scarcely reach the reproductive period. At the forty-fifth year, or thereabouts, the power is lost and the reason of the loss is understandable.

It would be quite feasable to contend that the sequence of birth was a more potent factor than the age of the parent. In fact Dr. Newsholme states as his opinion, though he gives no data on which he bases it, that large families and high death-rates are not associated. It is easy to understand how such a misconception arises when, as I suppose is the case with Dr. Newsholme, it is based on the impressions received from our social and private life. The big families we meet impress us and the small ones that should have been big are not noticed for the deaths are not mentioned. I have shewn in Tables III. and IV., and Dr. Buchan supports me, that large families and high death-rates go hand-in-hand, but whether this is due to the later births occurring during the period of the mothers' decline or are consequent on the exhausting influence of the previous ones, we may consider at this juncture. The initial birth of any family is usually not a good one, fortunately for our law of primogeniture and the principles on which we select our rulers, it is, if the mother be young, usually a girl. Beyond the factor of age there is every reason to believe that the pioneer of a family has much to overcome that is smooth for those who follow. I find the death-rate of the initial birth amongst the poor to be over 200 per 1,000 births of that kind. With second births it falls to 116 and then slowly rises, but irregularly until it reaches a figure approaching 300 per 1,000 for births of thirteen and over. The contention that ignorance on the part of the mother may have some influence may, I think, be disregarded, for in the class under consideration 90 per cent. were fed at the breast for practically the whole of the first year, though in proportion the greater number of deaths were amongst those fed artificially. The cause of this large number of deaths is to be found in the mother

herself. The first birth, both on account of the probable age of the mother and the initial difficulties, of which a prolonged birth is only one, is in most cases the weakest of the whole family; weakest not only physically but often mentally as well. This fact further is supported by my own observations amongst defective children and by independent work amongst the insane.

The death-rate is lowest with the second birth and then steadily rises. This is probably an age influence also, for we have seen that the mortality is lowest at about the twenty-fourth year, and the average age at which the second birth occurred in the mothers under consideration was a little under that year, the twenty-fifth year being the average for the third from which point the mortality rises towards both extremes of life. I do not think, provided a certain minimum interval is allowed to elapse, which interval is discussed under the heading of fertility (Table V.), that any ill effects upon the mother are consequent upon the previous birth; in fact I have reason to believe the reverse is the case. It is well known that a woman enjoys better health whilst carrying a child than at any other time. The arrest of phthisis under such conditions is a well appreciated fact. The influence of the exuberant vitality of the growing embryo in all probability extends to the mother herself, and should under normal conditions persist after birth. That some such substances do persist is proved by the fact that the sex of the previous birth influences to a slight degree that of the succeeding one (see Table VII.). Although my data is small still with some hesitation I state it, that the expectancy of life of women who have borne children and have maintained a suitable spacing of the births, at the forty-fifth year is greater than those who have borne no children at all. Other factors are, of course, at work, such as the possibility that the better and more physically fit are more likely to have children. This may be so, but my impression of the health of married and unmarried women agrees with my statistical findings, provided that temperance in sex indulgence has been exhibited.

Another interesting series of data is furnished by the possibility of accident, either at or preceding birth, and lends support to the theory of a strong age influence. It shews firstly the

importance of adequate spacing, and secondly as the age advances, the increased tendency to miscarry (see Table V.). We may assume from the distribution of the number of accidents according to age that there is no alteration in the vitality of the mother to account for the loss of the initial birth of a series as already noted, and that the high death rate distinguishing it from the others must depend on circumstances associated with the nurture and process of the birth itself.

Beyond this age influence there does appear to be one factor strongly predisposing to mishap and even affecting the future development of the child, and this leads to the consideration of the factors governing fertility, or perhaps fecundity is a more suitable word to express the process I wish to discuss. In this connection two groups of data are required (1) the number of mothers at risk at each age, and (2) the number of births occurring in the following year.

To take the number of women married as a standard is open to a serious objection, as it is well known that in a large proportion of our population, marriage follows and does not precede the impregnation for the initial birth. A much better series of data can be obtained. To have a second birth a first must have preceded it. Now we can easily find for any population the age at which the first birth occurred and thus the number of women at risk for a second or subsequent one, and hence by noting the actual number occurring we can calculate the probability of conception. It is seen from Table VII. that this probability rises to between the twenty-eighth and twenty-ninth years. "Duncan quoted from Marshall (*Physiology of Reproduction*) gives the thirtieth year" and then steadily falls again. It is interesting to note that the greatest fertility is at the middle of that period when we expect the best to be born.

Another method was used (see Table VIII.) amongst the better class people, and the results are mainly confirmatory of the figures I already have given. In this series the mothers were asked to give the time that had elapsed since the previous birth, their ages also being noted, and the figures are as follows. For the period under 20 it is under two years. During the following five years it reaches its lowest point, and then for each

quinquenniad it rises until after the fortieth year when the interval is under four years. To say that there should be a stated and uniform interval between each child is therefore not true, unless the age of the mother be considered. The period of rest necessary varies according to the age and capabilities of the mother, and roughly speaking, natural physiological processes have decided at what times re-impregnation shall take place.

There is no definite line or point at which these capabilities are decided, and the fate of a fertilised ovum is dependent on conflicting and fluctuating influences. The figures and data in this connection that I have collected do not shew any very regular sequence when considered in the light of one factor. Age, for example, gives evidence of a pre-disposing tendency, but it is not regular enough to exclude others. I admit that information on a question of this nature is not very reliable as it depends solely on the correct interpretation of certain events in the history of the mother, and I am aware that many women, especially in the class from whom I have collected most of my data, are really not cognisant as to what hash appened. The onset of the œstrous cycle, and one of no unfrequent occurrence after a confinement, begins with a miscarriage though the correct significance is not assigned to it.

It seems as if the period of recovery after birth can be divided roughly into epochs. (Marshall, *ibid.*) Firstly, there is a period, during which the reproductive functions are in total abeyance and during which ovulation does not occur; this period is one of months only. Ovulation begins before recovery is quite complete and much before lactation is over or even the re-establishment of the oestrum. Fertilisation may now occur, and the fertilised ovum may graft and form attachments, such attachments, however, are very weak and are easily broken, so that miscarriage is a common event. This period might be given as from the fourth to the eighth month for a normal woman at her best, the period varies according to the age. The next stage is one during which birth is a probability following fertilisation, though the infant when born is feeble and weakly, and even though it may live and attain some physical robustness, it never will reach that excellence that would have been possible.

The third period might be limited, roughly of course, as extending from the eighth month to the end of the first year, according to the age of the mother. Thus we may safely say with an average women at her best and most fertile period to achieve the highest possible development for the child, the interval of birth should be at least two years, this interval being varied according to the age. Too much importance cannot be laid on this matter of adequate spacing as I am fully convinced that most of the maternal troubles arise from errors in this respect. The education of our children in the powers of mastery over self and a few hints as to the direction of their efforts in later life, will be the main factor in removing this stigma of modern civilisation. I have not much faith in the direct result of improved sanitation except in so far as it affects the mother herself and makes her a physically and mentally superior person.

The deaths amongst males are greater than amongst females, but whether this is dependent on the sex itself or the mature years at which males are born, is a matter of some doubt. The impression one gets is that the difference is due to sex alone, and certainly in some few enquiries into death-rates of boys and girls born at the later years of life, the figures are against the males. As they only constitute a little over 100 I give them for what they are worth. For males the rate for children born between the thirtieth to fortieth year was 184 per 1,000, and for females 160.

Before I leave the question of age it would be scarcely considered complete unless some reference were made to the question of sex. I do not wish to enter into this interesting problem. All that is known pertaining thereto will be found in Dr. Marshall's book. I wish to revive, however, in a modified form, some of the theories that have been formulated previously, and further shew how they offer the most reasonable explanation to certain changes in our own population. A glance at Table IX., shews at once that the twenty-seventh year in the mother and at the twenty-eighth or twenty-ninth year of the father a subtle change takes place. Previous to these ages the tendency was to give birth to girls in a degree varying with the age, but after that period it is reversed. The relative male preponderance however is much greater in the later period than the

female in the earlier. Bearing in mind the greater mortality at later years and the greater death-rate amongst the males, with the fact that in the population under consideration more than half the births occured before the thirtieth year, the relative equality of the sexes is understood. Beyond this the point has some scientific value for it shews that sex is not a fixed quanitity and can be influenced by factors acting from without. The influence, moreover, of one birth on the sex of the next (see Table X.), and the relationship of the sex on the interval of time to the next impregnation, shew that substances derived from the fœtus persist after birth and influence the succeeding one.

Upon reference to the tables (No. VII., *et sequa*), it will be seen that sex is more likely to alternate than follow a sequence, and further, the interval is shorter after a boy than after a girl. Bearing this in mind it is possible to form some idea of the phenomena which underlie the decision of sex. No individual is wholly male or female, each have some rudiments, especially anatomical, of peculiarities pertaining to the opposite kind. Further than that we know that removal of the essential organs during the period of growth leads to the development of superficial characters, by which the other sex is distinguished. Hence we may assume that predominant or actual sex is inhibitory towards the recessive, or such attributes as distinguish it. Dr. Marshall does not lay much stress on this point. Embryology—the study of our pre-natal growth—teaches us that we, as individuals, recapitulate the essential features of the growth and development of our race, or to express it shortly Ontogeny follows the path of Phylogeny, making, however, frequent short cuts. Ontogeny is straight, whilst Phylogeny is tortuous. Now we know by this law that to begin with, all organisms are without differentiated sex, then bisexual or hermaphrodite, and finally unisexual, and there can be no doubt that a fertilised human ovum has in the first instance no idea of distinctive sex at all. It may be that actually the influences are predetermined, but officially, if I may use such a term in this connection, it cannot be the case.

Now whilst passing through those stages in our pre-natal existence that resemble those forms of life to which the lower

worms are allied, dating to before the origin of the back-bone (Invertebrata) it nominally is on the path to become bisexual. Now should either sex influence be stronger than the other, it inhibits the opposite without completely destroying the fundamental characteristics of that kind, modifying thereby the subsequent development. We must suppose that every ovum or sperm is not wholly male or female, but only predominantly so (see Marshall, *ibid.*) and that in the union of two such there is a relative sex predominance.

As these factors must depend on some chemical or other combinations mass influence must be considered, and it is impossible to imagine that the maleness of a sperm would be under all conditions exactly equal to the femaleness of an ovum, and hence a chance factor would determine the path that the organism would subsequently follow. If the difference is relatively large then no outside condition can alter its fate, and in such a combination though the sex be nominally not determined at fertilisation it really is. In a certain number the margin of difference of maleness and femaleness would be small, and in these, external conditions which may arise from age, nutrition, psychical conditions, and almost anything in fact that influences the mother, may turn the balance or accentuate the difference and thus decide the sex.

At times, in man rarely, but in lower animals more frequently, especially the Amphibia, the balance is maintained and neither male nor female obtains the upper hand, and through the want of decision arising thereby, the changes in the sexual organs do not occur in synchronism with the rest of the bodily development. All sorts of abnormalities are thus produced. True Hermaphrodites are practically unknown in man. They probably die before the time of birth. (An examination of miscarriages will shew on occasion certain conditions which rather support this view.) Cases, however, where the decision of sex has been arrived at too late to produce the necessary modifications of structure are by no means uncommon and the attempts subsequently made to remedy the error produce at birth most extraordinary conditions. (Pseudo-Hermaphroditism.)

The sexes then may be looked upon as physiologically antagonistic, and sociologically attractive, and this character

though nominally not determined at impregnation, in the majority of instances it really is. In a relatively small number (about one-sixth of the whole) it depends on external influences.

There are two aspects to discuss which I might digress from the argument and these are firstly, the origin of morality, and secondly, the relationship of the aforementioned fact to certain changes in the numerical sex constitution of our population. Practically in the whole of the vertebrata the sexes are produced in about equal quantities, and there is some evidence to believe that influences from without do affect this balance, though they do not appear to form any part in the maintenance of any particular breed. It must, however, be said that every factor that has been claimed to be a determinant has subsequently been denied by other observers. From the point of view of utility and to make the most use of the males an excess of females would be desirable, yet we do not see this evolution occurring in any of the great divisions of the higher mammals.

Sex, as we have shewn, is in the main a chance determination and its modification appears to be incompatible with any particular end in view, hence we find as we ascend the developmental tree an adaption being made to this characteristic. Amongst the lower animals many of the males are wasted from the point of view of reproduction. In the birds and mammals we see the males being more or less utilised in the care of the young and thus allowing of a more immature birth and greater post-natal development. In these animals mating for the season or until the young are mature is the rule.

This chance determination of numerical sex equality thus becomes an integral factor in the survival of that particular breed or kind. Now man differs from all other animals in the fact that the female under normal conditions conceives for a second before the first is mature and capable of independent life. Therefore mating in the interest of the young must be for the whole reproductive period of life, as at no period of time can the male be said to be sociologically free of the female. It thus happens that the instinct which we call morality is an evolution in the interest of the young which is inherent in our being. It does not depend on teaching and would develop irrespective of any

religious or other sentiment. The numerical balance becomes of great importance, greater to ourselves than in any other class of animal.

Our communal instinct, which may be regarded as a development of the moral, brings about the formation of what is known as "race," the maintenance of which depends on the rapid rectification of the sex balance when disturbed through any cause. We thus find those species of mankind predominant where the rectification of disturbances in population, either through war or famine, had been most quickly re-established, or in other words, in those breeds in which the influences we have already discussed are best developed. So it happens, what is always the case in phylogenetic development, a chance factor produces an accommodation which eventually forms an integral part of survival.

We may assume that the extrinsic conditions modifying sex are more marked in man than in any other kind, and consequently are best studied in him. Further assuming the truth that age modifies sex, a little thought will show how the laws of supply and demand will produce a self-regulating mechanism through the mean age at which mating will occur. Thus with a male excess the demand for females will be great, and hence all females will mate early with the stronger and more mature males. Should the reverse be the case then we will find that all the males will be made use of. The regulating factor, however, will in all probability rest mainly with the female as even in man the male is still somewhat gregarious.

In the last Report of the Registrar-General (1909) certain tables appear which have given rise to much speculation. It has been felt that an advance in our knowledge would be achieved could an adequate explanation be given to the changes that are occurring in the sex constitution, and mean age at marriage, of our population. Without giving full details, which will be found in the above-mentioned report, the facts are briefly as follows:— The relationship between the male and female births is gradually altering. From 1841 to 1850 the ratio was 1,044 males per 1,000 females. Previously the males had risen to 1,052. From 1850 to 1900 there is a continuous drop to 1,036 males per 1,000

females born. In 1901 there is a slight rise to 1,037, but from then up to the present time it has fallen steadily, being now 1,033 males per 1,000 females. It is curious that this rise, occurring in the year 1900, was concurrent with a disturbance of the marriage rate in the previous quinquennium, so that if we bear in mind the mean age at marriage at this time when considering the sex of the births three or four years later, we see at once there is a direct relationship between the two factors. Age at marriage, however, is not the sole cause underlying the time at which the birth will occur. Our birth-rate is falling we know, but so also is that for the whole of Western Europe, with France heading the list and Russia bringing up the rear. On the other hand, in Japan the birth rate is rising and has increased in the last twenty-five years from 25·8 to 33·9 per 1,000 of the population. Beyond this the sex constitution of all these great communities has altered in direct relationship to the birth-rate.

In those countries where the birth rate is declining, as in our own, females are relatively increasing, whilst in those where the rate has an upward trend, the male ratio is becoming greater. Accompanying this general alteration in the sex relationship of the countries of Western Europe, there is also noticed in all a change in the mean age at marriage. With ourselves it has advanced six months in twenty-five years, though in all probability it is really greater than officially given, partly owing to the decrease in illegitimacy and also to more correct age registration. Bearing in mind the table I have given at the end, the tendency of the marriage age to advance and hence the time at which the children are born, would be to produce a greater excess of males and thus neutralise the female preponderance already existent.

In savage man there is no doubt that the mechanism of regulation of sex balance would follow these lines. In civilised man, however, a new factor has been added, partly through a natural development no doubt but also through the rise in elementary education, which has spread throughout Europe since the time of Pestalozzi, in 1824, and the cultivation of what I may term "the power of self-inhibition."

Dr. Newsholme and Mr. Stevenson shewed in a paper before the Statistical Society that the fall in our birth-rate was due to

the loss of births in the later years and there is no doubt that this is true. They and a certain Ecclesiastical Dignitary of the Established Church attributed this to certain artificial methods adopted by the parents. This I doubt. I am of the opinion that education and the establishment of other mental pleasures and a general desire to control our passions have been, and are sufficiently strong to inhibit to a considerable extent, sexual desire in later life. The women are moreover less inclined to undergo the repeated ordeals of birth.

It is a curious nemesis that the reluctance of the mothers to bear children at these years when the males preponderate, should in course of time produce a difficulty in the supply of suitable mates for their daughters. At the present time many are compelled to forego marriage or seek a mate of a lower social grade. In this way civilisation has undermined the operation of a natural law, and a new social accommodation has had to be devised which we see in evolution at the present time, namely, the employment of women in labour for the weal of the state, other than the reproduction and care of the young. Whether it would not be better if she were employed in these spheres, for which she is specialised yet remains to be seen. If not then this race will be over-run by some other which has evolved a better economy. If it is so then will the community continue to prosper and maintain its position.

To return to our theme, two headings still require some notice. Firstly, psychological factors, as judged by illegitimacy as a standard, and secondly, the contentious field of environment. Illegitimacy offers several points of interest and the crude rate as is usually given, affords very little data for analysis. In the present enquiry the ages of the mothers, sequence, sex and deaths in the first year, were noted (see Tables XI. and XII.). Now every mother must have a first birth, and though in the population under consideration, which lived in the poorer quarter of this town, the rate was 14 per 1,000 births, when we considered first births only it rose to 47 per 1,000 births, which gives a much more accurate idea of the morality of the mother. Thus in 5 per cent., a large percentage of the women had disobeyed the primeval instinct of morality. It is interesting to note that

the age at which illegitimacy occurs, are the younger years, and that the distribution is not normal. There are too many at ages over 30 and under 25 and too few between 25 and 30.

There is much reason to believe that young women, after an illegitimate first birth eventually get married. Apparently this happened to over 50 per cent. The rise in later years, that is after 30, may be due to desertion by the legitimate husband or his death, the deserted wife or widow living with some man as his housekeeper. The ratio of first legitimate births to the rest is about 1 to 6, and illegitimate 1 to 3. This, as I have said, arises partly from the fact of the ultimate marriage of the mother and also possibly to certain diseases the maintenance of which depends on promiscuous intercouse and which are a frequent source of sterility. The true prostitute is essentially a degenerate and either through acquired disease, or want of fertility is a type that is constantly tending to die out, if left to herself and not nurtured in Workhouses.

Turning now to the death-rates in the first year amongst these two types of infants we notice great differences, for all legitimate births the rate is seen to be 170 and with the illegitimate 210. If, however, we confine ourselves to first births only, the rates are 246 and 400, an enormous figure; an eventuality, however, with which one cannot help but sympathise and which no doubt is a factor in the ultimate marriage of the mother. The feeding of the children differed a good deal (Table XIII.), 25 per cent. of the illegitimates were artificially fed, and of these a little under one-fourth died in the first year. Three per cent. of the legitimates were similarly fed, and of these a little over one-fourth also died in the first year. The ages of the mothers of these two classes of children are not the same, being lower with the illegitimates, so that where artificial feeding is once established the care they afterwards obtain appears to be much the same, nor does there seem to be any disparity in the gift of life that each receive at birth.

With those fed normally the death-rate is greater amongst the illegitimates. With legitimates it is eight per cent., but with the former it is a little over twenty per cent. The data from which these findings were obtained were not very numerous,

still I think we can assume that taking all things into consideration, the illegitimate birth is not a good one, and eugenically its early decease is scarcely to be regretted. It is interesting to note the close similarity between illegitimacy and female excess in any population. A comparison between the rates for country and urban areas bears this out. In my own town, with a population accustomed to very heavy work, the rate is remarkably low. There is, however, a male excess at marriageable ages, and practically any woman can find a mate. The influence of this is good and has a very beneficial effect on social life, tending to prevent disturbances in trade. The underlying reason is obvious.

We now come to the last of our series of considerations influencing the birth of the best and its chance of survival, namely, environment. This term is naturally very vague and is never used in exactly the same sense by any two observers, yet we read some very dogmatic statements as to its influence on immature life. Nothing can be more obvious, though with some glaring and important exceptions, than the association between the high infantile mortality rate, and what is usually spoken of as "slum property." From this association most experts, those employed by the Government included, have deduced the fact that they are cause and effect.

Working as I have done with the people themselves my feeling is that though these two conditions are frequently associated the influence is not so direct as we are led to suppose. It does appear as if certain mental traits of character desire and seek certain surroundings, and it is those mental attributes which choose a slum as a place of abode that are really responsible for the correlation we observe. The contention that there is no choice on the part of this section of our population has not the amount of truth in it that some would have us believe. As sentient beings we can modify our environment, and it is just that attempt at modification that is wanting, and generally the denizens of this class of property, giving this meaning to environment, are living below the stimulus of their needs, and would fall to an even greater condition of degradation, did the local authorities allow.

It is this want of effort to create an environment of a kind that is the common cause of slum areas and high infantile rates. There is nothing so likely to test the power of effort of a mother as the care of an infant. It is in this crucial test that they shew their mental and physical unfitness for the task they are called upon to perform. Of course, mental and physical characteristics react on surroundings, and surroundings react back again on the individual, and in such a medley of cross influences it is hard to say which is paramount and to give the amount of their relative value, indeed the needs of each case will vary.

The amount of energy and effort necessary might easily be negotiated by women with, say, two children, the stimulus of her needs being able to bring forth the proper response. But supposing the needs were increased to, say, four children and her strength and mental abilities were insufficient to meet the new demand, she would then be in the position of a typical slum dweller, whose chief characteristic is that the stimulus of her environment does not create sufficient energy to meet her needs. This criteria is not a fixed one and may oscillate to and fro, either through financial reasons or conditions of health. Mr. Rowntree in his account of town life gives a curve of the rise and fall of a man living under poor conditions above and below the poverty line. He shews that it is from the twenty-fifth to the forty-fifth year when the needs are most and have risen out of all ratio of his ability to supply them.

It is upon those who are not responding in the way I have mentioned that infantile mortality falls with a heavy hand. To shew statistically, a subtle factor of this kind is almost impossible, but to give some idea of its influence one can adopt a method, though much criticised, which will, I think, suit our purpose, especially if the detail obtained is sufficiently reliable. The method is to classify the population under consideration into the number of rooms occupied by each unit, and to trace their subsequent history.

A reference to Tables XIV. and XV. will shew that the relationship between the needs of a family, and the capability of the mother to supply them, is under the greatest strain in the four-roomed tenement. The death-rate in the one-roomed tenement

is the highest, reaching the figure 200 deaths per 1,000 births in the first year. This figure includes the majority of deaths amongst illegitimate children and a large proportion of the first births but with these excluded it would fall to below 150. Taking this view, which I think is the correct one, the statistical findings agree with what observation tends to teach. Actually, though figures do not indicate it, overcrowding is much worse in a four-roomed tenement than in one of any other size. This would be shewn better perhaps if we deducted from our figures the number of rooms used as a scullery or kitchen, or for other domestic purposes.

If we consider initial births only (Table XVI.) the same sequence is observed, that excepting one-roomed tenements, the heaviest incidence falls on the four-roomed house. The latter figures are very small and too much significance must not be attached to them. They are also complicated by the fact that although the birth was an initial one, the mother was a lodger, and hence the same conditions as to overcrowding apply. The physique of the child at birth as judged by its height and weight is of some interest (see Table XVII.) In a little over 200 cases, which were obtained with some difficulty, it was seen that as the mother increased in age and occupied a larger tenement the children increased in height. The weight also increased absolutely, but relatively there is a decrease with those living in the four-roomed tenements. The antagonistic influence met with in a larger house seems to have had a detrimental effect on the nutrition of the child, which should have been bigger and heavier at the 29th year, the average age of the mother in such a group.

These figures are, however, small and are only of value in so far as they tend to support the present line of argument. The economic position of the unskilled labourers, and this section of my enquiry was made with particular reference to them, is peculiar. The wage they ask for as a class, and which of course they receive, is barely sufficient for a man and wife to live on and leave sufficient offspring behind them suitably trained and of a physical efficiency to take their place. To a young man this is ample, but for an elderly one with a large family, it is not enough, nor does it even meet the needs of the average family of five.

It is at this time when their needs are in excess of their abilities to supply them that everything tells against the mother, and the essential conditions of a slum household become established. Such a state of affairs will be found scattered throughout any community, though in certain areas it would be more concentrated than in others. We wrongly attribute our death-rate to the concentration, rather than its cause. The method of attack is scarcely at the first sight rational, but its ultimate result is good. Local Authorities increase the needs of the man by insisting on his occupying a larger and better house which must cost more. The worker is probably unable to supply the demand and the household duties are more than the enfeebled physique and depleted mental condition of the wife can cope with. This principle drives some completely under, the struggle is given up and they put themselves upon the community for support. With the majority the establishment of this minimum standard of decency, which increases the needs of the individual, is to make him ask for more and use greater effort to obtain it. By using our power to compel or induce this class of people to improve their conditions and thus increase their needs we hope to create an additional strength to meet the demand, and an adaptability to circumstances that formerly with them did not exist.

The crude association of environment and death-rate is to my mind very misleading, and unless considered on the lines I have laid down, cannot be of much use to support or modify Local Government. The Infantile rate of any community may vary from time to time and even considerable differences will be noticed in other towns living under similar conditions, and the nature of the manhood produced would have a certain correspondence with infancy. Selection is more potent in those wherein the death-rate is highest, and further, the contention that children surviving to later life are marred by their struggle in early years, is not borne out by actual observation. One finds that actual defects are more prevalent amongst those living under so-called good conditions than in those living in bad environment. It does seem that we have here the survival of the most hardy and hence those endowed with the greatest vitality. Race must of

course have some influence in a problem of this nature, but at present we possess no reliable data on which any conclusions can be based, though it seems as if the mortality of the North of England was greater than that of the South. The general characters of this broad classification as applied to adults is well-known.

Conclusions.

We may summarise in the following way:

The age of parent predominates, rising as we have seen to a maximum and then slowly falling.

The interval of birth is most important, varying mainly according to age and also modified by other conditions.

The sequence of birth is of importance as regards the first, but subsequently it is of minor influence. Psychical conditions and sentiment have a place as is shewn by the fate of illegitimates.

Environment directly is a minor cause but indirectly, as judged by the needs and the capacity to fulfil them it approaches the significance of age.

Lastly any conclusions based on the changes of infantile mortality alone, irrespective of the mother, must from their very nature be valueless.

TABLE I. SHEWING THE HISTORIES AS SUPPLIED BY THE MOTHER

Age of mother	*No. of enquiries*	*Total no. of births*	*Accidents*	*No. born alive*	*No. still living*	*No. who died in first year*
16	4	4		4	4	
17	10	10		10	10	
18	26	32	6	26	24	2
19	51	63	1	62	56	6
20	82	111	3	108	97	9
21	89	154	12	142	121	14
22	102	218	19	199	175	16
23	129	313	19	294	249	31
24	118	321	24	297	241	39
25	110	321	18	303	241	37
26	110	384	31	353	266	48
27	100	399	36	363	273	66
28	103	421	26	395	291	66
29	98	463	27	436	323	59
30	101	426	41	385	346	75
31	68	307	16	291	236	31
32	88	522	36	486	360	61
33	75	479	32	447	317	66
34	77	559	68	491	358	69
35	61	437	26	411	312	44
36	63	413	25	388	293	59
37	54	425	33	392	285	68
38	44	396	47	349	244	45
39	40	381	61	320	217	62
40	41	393	34	359	255	60
41	9	110	8	102	66	17
42	23	289	44	245	168	44
43	12	138	13	125	97	12
44	12	128	12	116	73	30
45	3	42	4	38	25	1
46	3	33	4	29	25	1
47	1	9		9	7	2
48	1	13		13	10	1
49	1	12		12	9	2
	1909	8726	726	8000	6074	1143

TABLE NO. II. SHOWING THE DISTRIBUTION OF THE FAMILY, AND SEX OF EACH BIRTH ACCORDING TO THE AGE OF THE MOTHER

Age of Mother	Sex M.	Sex F.	Order of Births: No. of 1st bths.	No. of 2nd bths.	No. of 3rd bths.	No. of 4th bths.	No. of 5th bths.	No. of 6th bths.	No. of 7th bths.	No. of 8th bths.	No. of 9th bths.	No. of 10th bths.	No. of 11th bths.	No. of 12th bths.	No. of 13th bths.	No. of 14th bths.	No. of 15th bths.	No. of 16th bths.	No. of 17th bths.	No. of 18th bths.	No. of 19th bths.	No. of 20th bths	No. of 21st bths.	No. of 22nd bths.	Total no. under Enquiry.
16	1	3	4																						4
17	5	5	10																						10
18	10	17	20	6																					26
19	25	31	38	13																					51
20	38	47	59	19	2	2																			82
21	46	42	42	36	7	2	1	1																	89
22	55	53	35	36	18	12					1														102
23	66	66	29	52	27	12	5	3		1															129
24	55	65	27	29	30	18	11	2	1																118
25	62	48	18	21	35	26	7	3																	110
26	54	61	11	21	26	23	18	9	1	1															110
27	46	57	11	14	20	16	18	13	2	3	2			1											100
28	56	49	10	13	13	25	24	8	4	4	2														103
29	55	46	3	5	21	16	19	19	9	4	1	1													98
30	64	37	2	9	13	15	19	17	11	9	3	2				1									101
31	37	32	5	9	9	9	14	10	8	2	1	1													68
32	45	45	1	5	6	7	15	21	18	6	4	3	1		1										88
33	41	40	5	4	3	3	5	15	12	14	8	5	1												75
34	38	43		3	3	4	7	13	14	12	7	5	3	3	2	1									77
35	33	25		1	3	4	7	7	8	16	7	5	1	1	1										61
36	30	33	3	2	6	4	7	10	6	9	7	1	6	2											63
37	31	24	1	2		2	6	6	7	10	5	5	4	2	2	2									54
38	24	22		1	1	2	1	4	7	4	4	7	2	5	2	3			1						44
39	24	25	2		1		2	4	3	4	6	4	4	1	2		2	2	3						40
40	27	19		2		1	1	3	5	3	4	5	5	6	2	1		1	2						41
41	6	3										2	2	2		2		1							9
42	15	10							1		3	1	7	4		1		2	1	2			1		23
43	6	8					1		1	1	2	1	1		2	1		1						1	12
44	7	4			1						3	2	1	2	1	1		1							12
45	2	1													2		1								3
46	3						1								1	1									3
47	8	1									1														1
48	1														1										1
49		1												1											1
	1,008	963	336	303	245	203	189	168	118	103	71	50	38	30	19	14	3	8	7	2			1	1	1,909

TABLE III., SHOWING INFANT MORTALITY RATE ACCORDING TO POSITION OF CHILD IN FAMILY (DR. BUCHAN).

Position of child in family	*Number investigated*	*Total deaths*	*Infantile rate*
1st	1191	177	148
2nd	984	70	80
3rd	761	79	103
4th	710	80	112
5th	510	70	137
6th	378	56	148
7th	361	57	157
8th	256	39	152
9th	168	32	190
10th	110	28	235
11th and onward	187	45	240

TABLE IV., SHOWING CERTIFIED CAUSES OF DEATHS ACCORDING TO POSITION OF CHILD IN FAMILY (DR. BUCHAN.)

Total children		*Pre-natal and natal*	*Post-natal*	*Undetermined*
First-born infants	1,191	110	49	13
Second to fourth inclusive	2,455	58	144	35
Fifth onwards	1,979	71	194	48

Leaving out the first birth this table shows the effect of the sequence of birth in increasing the liability to accident.

TABLE V., SHOWING NUMBER OF MISCARRIAGES PER 1,000 BIRTHS AT EACH AGE PERIOD

Age period	*No. of accidents per 1,000 births*
Up to and including 19th year	63
" " 24th "	68
" " 29th "	69
" " 34th "	84
" " 39th "	93
" " 44th "	103
" " 49th "	72

After 45 years the numbers are too few to be of significance.

TABLE VI., INFANTILE MORTALITY IN RELATION TO AGE OF MOTHER—AGES BEING OBTAINED ON OCCURRENCE OF DEATH

Age of mother	*Total number of births*	*Deaths in first year*	*Per 1,000 births*
Under 19	152	26	171
20 to 24 inclusive	536	66	132
25 " 29 "	396	66	166
30 " 34 "	316	74	170
35 " 39 "	150	34	220
Over 40	36	12	330

TABLE VII., FERTILITY.

NUMBER OF CHILDREN BORN EXCLUSIVE OF FIRST BIRTHS PER 1,000 WOMEN AT RISK AT EACH AGE PERIOD (POOR CLASS POPULATION)

Age	*Number at risk for 2nd and subsequent births*	*Number of children born exclusive of 1st births*	*No. of 2nd and other births per 100 mothers at risk*
16 and 17	14		
18 „ 19	74	17	23
20 „ 21	174	71	41
22 „ 23	240	135	58
24 „ 25	286	182	63
26 „ 27	307	199	64
28 „ 29	320	198	61
30 „ 31	328	160	48
32 „ 33	332	159	47
34 „ 35	331	138	41
36 „ 37	330	117	35
38 „ 39	323	84	26
40 „ 41	313	50	16
42 „ 43	310	35	13
44 „ 45	300	12	4

TABLE VIII.

AVERAGE PERIOD OF TIME BETWEEN EACH BIRTH ACCORDING TO AGE OF MOTHER—GOOD WORKING CLASS POPULATION

Age	*Number observed*	*Average time between each birth*
Under 20	8	2·5 years
20 to 25	70	2·4 „
25 „ 30	170	2·6 „
30 „ 35	84	2·8 „
35 „ 40	44	3·3 „
over 40	26	3·6 „

TABLE NO. IX., INFLUENCE OF AGE ON SEX

Age of mother	*Number of* *Males*	*Females*	*Females per 1,000 males*
Under 20	41	46	1,120
20 to 24	260	273	1,040
25 „ 29	273	261	960
30 „ 34	225	197	870
35 „ 39	152	129	850
40 „ 44	61	44	720
45 „ 49	6	3	500
26	51	61	1,130
27	46	57	1,240
28	56	49	810
29	55	46	820

The 27th year is the year of absolute equality, and, as will be shown later, the best female is born before that age and the best male shortly after. It approximates also with the age of greatest fertility and if the spacing of the births is suitable there is least chance of a mishap.

Age of Father	*Males*	*Females*	*Females per 1,000 males*
25th to 30th year	67	68	1,010
30th to 35th „	73	63	880

TABLE NO. X., SHOWING INFLUENCE OF SEX OF PREVIOUS BIRTH ON FERTILITY OF THE MOTHER AND SEX OF SUBSEQUENT CHILD

No. of births 382	*Where the preceding birth was a boy and present one a*		*Where the preceding birth was a girl and present one a*	
	Boy	*Girl*	*Boy*	*Girl*
	90	102	100	90
Per 1,000 births	468	532	526	474
Average interval in years	2·9 yrs.	2·6 yrs.	3·0 yrs.	2·8 yrs.

Average interval from boy to boy or girl 2·75 yrs.
" " " girl to girl or boy 2·8 yrs.

Number of boys following boys or girls following girls ... ... 180 or per 1,000 births 471
Number of boys following girls or girls following boys ... ... 202 " " " 529

ILLEGITIMACY

TABLE NO. XI., COMPARING LEGITIMATE AND ILLEGITIMATE CHILDREN

	All births		*Deaths in first year*	
	Number	*Rate per* 1,000	*Number*	*Rate per* 1,000
Legitimate	1,285	850	30	170
Illegitimate	30	150	8	246

TABLE NO. XII.

	Same with first birth only		*Deaths*	
	Number	*Rate per* 1,000 *births*	*Number*	*Rate per* 1,000
Legitimate	213	953	40	210
Illegitimate	10	47	4	400

Average age of mother for legitimate 1st birth 23
" " " " illegitimate 1st birth 20

Illegitimate males are 17 to 12 females taking first births only and such as occurred at younger years the numbers were 10 males to 8 females

TABLE NO. XIII., SHOWING NUMBER AND DEATH-RATES AMONGST THE ARTIFICIALLY AND BREAST-FED LEGITIMATE AND ILLEGITIMATE CHILDREN

	Total Number	*Number Breast-fed*	*Number of deaths in first year*	*Artificially fed*	*Number of deaths in first year*
Legitimate	1,285	1,198	140	76	24
Illegitimate	30	23	3	7	2

TABLE NO. XIV., SHOWING DISTRIBUTION OF POPULATION UNDER CONSIDERATION WITH NUMBER LIVING IN EACH TENEMENT, AGE OF MOTHER, SIZE OF FAMILY AND DEATH-RATES

No of rooms per tenement	*Number of enquiries*	*No. living per room*	*No. of previous births per mother*	*Average age of mother*	*Number of deaths in first year*
1	90	3·1	2·2	23	220
2	273	2·2	4·9	26	135
3	410	1·9	5·0	29	172
4	307	1·3	5·3	30	227
5 and over	85	1·2	7·1	34·5	150

TABLE NUMBER XV., SHOWING DEATHS OF INITIAL BIRTH ONLY IN TENEMENTS OF VARIOUS SIZES.

No. of rooms per tenement	*Number of enquiries*	*Deaths in first year of initial births*
1	15	194
2	46	155
3	70	207
4	51	211

TABLE NO. XVI., SHOWING DEATH-RATES IN FIRST YEAR OF LIFE PER 1000 BIRTHS, ASSOCIATED WITH THE SIZE OF HOUSE AND AGE OF MOTHER

Age	*No. of enquiries*	*Tenements, two rooms and under*	*Tenements of three rooms and over*
19th year and under	46	330?	104
20 to 24	273	141	116
25 to 29	261	150	153
30 to 34	197	156	190
35 to 39	129	100	219
40 years and over	47	250	227
All years	953	171	168

TABLE NO. XVII., SHOWING THE PHYSICAL DEVELOPMENT OF INFANTS, BORN AT DIFFERENT AGES AND TENEMENTS.

Children born in	*Number of observations*	*Average age of mother*	*Length of child in inches*	*Weight in lbs.*
1 roomed tenements	27	23	19·6	7·2
2 ,,	42	26	19·7	8·5
3 ,,	58	29	20·5	8·8